

REMARKS

Reconsideration of this Application is respectfully requested. Applicants have addressed every objection and ground for rejection stated in the Office Action mailed October 23, 2003, Paper No. 7, and believe the Application is now in condition for allowance.

1. Statement of the Case and Status of the Claims.

The present invention provides a novel electrode active material, as well as electrodes and batteries containing the same. In a first instance, the electrode active material is represented by the formula $A_a M^1_e M^2_f M^3_g PO_4$, wherein:

- (a) A is selected from the group consisting of Li, Na, K, and mixtures thereof, where $0 < a < 1$;
- (b) M^1 is a +2 oxidation state transition metal, where $e > 0$;
- (c) M^2 is a +2 oxidation state non-transition metal, where $f > 0$; and
- (d) M^3 is a +3 oxidation state non-transition metal, where $g > 0$;

wherein $a + 2e + 2f + 3g = 3$, and a, e, f and g are selected so as to maintain electroneutrality of the compound.

In a second instance, the electrode active material is represented by the general formula $A_{a+x} M^1_e M^2_f M^3_g P_{1-x} Si_x O_4$, wherein:

- (a) A is selected from the group consisting of Li, Na, K, and mixtures thereof, where $0 < a < 1$ and $0 < x \leq 1$;
- (b) M^1 is a +2 oxidation state transition metal, where $e > 0$;
- (c) M^2 is a +2 oxidation state non-transition metal, where $f > 0$; and
- (d) M^3 is a +3 oxidation state non-transition metal, where $g > 0$;

wherein $a + 2e + 2f + 3g = 3$, and a, x, e, f and g are selected so as to maintain electroneutrality of the compound; with the proviso that when M^1 is Fe or Mn, M^2 is not Mg, Zn or Ca and M^3 is not Al, Ga or Zn.

Claims 1 - 60 are currently pending in the present Application. Upon entry of the present Amendment, Claims 1 - 18, 26 - 41, 43 - 44 and 48 - 51 will be cancelled, Claims 45 - 47 and 60 will be amended, new Claims 61 - 93 will be added, and Claims 19 - 25, 42, 45 - 47 and 52 - 93 will be pending. Care has been taken to ensure that the new Claims contain no new matter.

2. Allowed Claims 19 - 25, 42, 49 and 52 - 60

The Examiner stated in the Office Action that Claims 19 - 25, 42, 49 and 52 - 60 are allowed. Applicants thank the Examiner for her consideration of these Claims, and for deeming the subject matter thereof allowable over the prior art of record. Applicants will refrain from canceling the remaining Claims, at this time, in order to provide the Examiner an opportunity to consider the amended and new Claims presented herein.

Applicants note that Claim 45 has been amended to explicitly recite all of the limitations of allowed Claim 19, and Claim 60 has been amended to explicitly recite all of the limitations of allowed Claim 52. The preambles of Claims 45 - 47 and 60 have been amended to conform with the subject matter of the body of these Claims, and Claim 47 has been amended to more clearly define the composition of the second electrode.

New Claims 79 - 85 depend directly or indirectly from Claim 45, and new Claims 86 - 93 depend directly or indirectly from Claim 60. Applicants submit that because Claims 19 and 52 are deemed allowable over the prior art of record, Claims 45 and 60, as amended, and all Claims depending there from, are likewise allowable over the prior art of record. Accordingly, Applicants respectfully submit that new Claims 79 - 93 are in condition for allowance.

3. Claim Rejections Under 35 U.S.C. §102

Claims 1 - 3, 5 - 8, 11 - 16, 26 - 30, 40, 41, 45 - 48 and 50 stand rejected under 35 U.S.C. §102(a) as being anticipated by EP 1094533 to Yamada et al. ("Yamada '533"), under 35 U.S.C. §102(b) as being anticipated by WO 00/60680 to Yamada et al. ("Yamada '680"), and under 35 U.S.C. §102(e) as being anticipated by US 2003/0077514A1 to Barker et al. ("Barker '514"). Claims 1 - 18, 26, 41, 43 - 44 and 48 - 51 have been cancelled, and substantially replaced with new Claims 61 - 78.

Yamada '533 and Yamada '680 each disclose, among other things, a positive electrode active material represented by the general formula $\text{Li}_x\text{M}_y\text{PO}_4$, wherein $0 < x \leq 2$, $0.8 \leq y \leq 1.2$, with M containing a 3d transition metal. (See, Col. 2, ll. 31-39 of Yamada '533). Yamada '533 and Yamada '680 each also disclose that M may be a mixture of certain 3d transition metals. In one particular embodiment, Yamada '533 and Yamada '680 each disclose an electrode active material represented by the formula $\text{Li}_x(\text{Mn}, \text{Mg})_y\text{PO}_4$. (See, Col. 6, ll. 50 - 57 of Yamada '533).

Barker '514 and the present Application are commonly assigned to the same entity. However, because Applicants respectfully submit that Barker '514 does not teach or suggest the subject matter of the Claims presented herein for the Examiner's consideration, Applicants will refrain from showing that the invention disclosed in Barker '514 is not "by another".

Barker '514 discloses, among other things, an electrode active material represented by the general formula $\text{LiMI}_a\text{MII}_b\text{PO}_4$, wherein MI and MII may be the same or different from one another, and wherein at least one of MI and MII is oxidizable from its initial condition in the compound. Barker '514 also discloses that MII may be selected from non-transition metals and semi-metals. (See, Paragraph 8 of Barker '514).

However, the prior art of record fails to teach or suggest an electrode active material as recited in new Claims 61 - 85. New independent Claims 61 and 69 recite, among other things, an electrode active material represented by the formula $\text{A}_{a+x}\text{M}^1_e\text{M}^2_f\text{M}^3_g\text{P}_{1-x}\text{Si}_x\text{O}_4$, wherein:

- (a) A is selected from the group consisting of Li, Na, K, and mixtures thereof, where $0 < a < 1$ and $0 < x \leq 1$;
- (b) M^1 is a +2 oxidation state transition metal, where $e > 0$;
- (c) M^2 is a +2 oxidation state non-transition metal, where $f > 0$; and
- (d) M^3 is a +3 oxidation state non-transition metal, where $g > 0$;

wherein $a + 2e + 2f + 3g = 3$, and a, x, e, f and g are selected so as to maintain electroneutrality of the compound; with the proviso that when M^1 is Fe or Mn, M^2 is not Mg, Zn or Ca and M^3 is not Al, Ga or Zn.

Accordingly, because Yamada '533, Yamada '680 and Barker '514 fail to teach or suggest Applicants invention as claimed in new independent Claims 61 and 69, Applicants respectfully submit that new independent Claims 61 and 69, and all claims depending there from, are patentably distinct prior the prior art of record. Accordingly, Applicants respectfully submit that new Claims 61 - 78 are in condition for allowance.

4. Conclusion.


In view of the remarks presented herein, Applicants submit that every objection and grounds for rejection stated in the Office Action mailed October 23, 2003, Paper No. 7, have been overcome. Accordingly, Applicants respectfully request allowance of all Claims presented herein.

Should anything further be required, the Examiner is respectfully requested to telephone the undersigned at 702-558-1071.

Respectfully submitted,

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